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RESEARCH ARTICLE

Analysis Students' Mistakes of Teacher Professional Education In Completing Story Problems Based on Newman Procedures

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ABSTRACT

The purpose of this study was to see students mistakes in solving story problems based on the Newman's procedure. The type of research used is descriptive qualitative research. The data retrieval technique is done through observation and testing. Observation is used to see student activities learning while tests are used to see the location of errors in student work according to the newman procedure. The results showed that the error in the skills process was 33% and the lowest error in the answer error was 8.2%. Errors caused by students who cannot read symbols, charts or charts, cannot solve problems properly, are wrong in solving steps and cannot be published or explained properly.

1. INTRODUCTION.

Mathematics is a science that has developed in terms of its application. This is certainly influenced by human success in applying mathematics. Therefore the success in understanding mathematics becomes a benchmark for achieving or not in the learning process that has been carried out. This success is certainly used in its application in daily life. Examples of mathematical problems that often arise in everyday life are contextual problems that are expressed in the form of story problems. The problem of the story that often arises is the mathematical problems that solve it using problem-solving (Suci, 2016). The process of solving the problem of the story certainly requires skills or methods so that the problem of the story becomes resolved.

The process of solving story problems in mathematics certainly must be changed into a mathematical form or mathematical model. Mathematical models are one of the ways that can be used for the first step in completing story problems, namely by formulating what is known in the problem into a mathematical form so that the mathematical form can be solved by counting operations or operations in mathematics. Problems related to the problems of daily life that can be solved using mathematical sentences that contain count operations can be said to be mathematical story problems (Raharjo & Astuti, 2011). The existence of the story problem can train someone to think mathematically. In addition to training students' mathematical and analytical thinking processes, story questions are useful for practicing student counting skills. Mastering material concepts, understanding language, modeling mathematics, doing calculations, and determining the final answer according to the problem, is the ability of students to have to solve the problem of the story.

The story problem that is usually used in examples in universities is usually the questions that are associated in everyday life as a manifestation of the story matter. Story problems have an important role in mathematics learning when students are faced with questions related to their daily lives (Winarni, 2011). The story problem has many benefits, one of which is for the development of student thinking and reasoning processes, because completing story problems requires understanding and reasoning. Umam (2014) with thinking and reasoning students can know the purpose of the problem. Students are required to be able to do modeling from the story problem into the mathematical model, understand the problems to be solved, and be able to connect the material to the problems that have been faced so that they can solve the story problem.

The process of solving the story problems that students do is still a frequent mistake. This is usually caused by the students being unable to understand what is meant in the question, the inaccuracy of errors in calculations and errors in the use of formulas. Rindyana & Chandra (2013) said that in his research that the results of student tests showed that many grades were still below the standard of completeness that had been set by the school, even though the questions given were classified as fairly easy to do. Kurnia (2014) in his research showed that in solving the story problems students' abilities were still relatively low. There were 63.8% of students getting below standard completeness. The number of percentages that get below the standard of completeness is a sign that students experience difficulties so that in solving math problems, mistakes occur. These errors become a benchmark for mastering student material. So that with the existence of these problems it is necessary to do an analysis in the execution of the

questions to find out the causes of students experiencing errors in solving the problem.

The theory that can be used in analyzing student errors in solving story problems, for example, is the Newman Method. Newman Analysis Method is a method that can help overcome difficulties in solving story problems. Newman stated that there are 5 basic steps that must be achieved after students solve mathematical problems, namely reading, understanding, transformation, process skills, and writing answers (White, 2010). There are five Newman error analysis procedures in solving mathematical problems, namely; (1) Errors in reading questions. (2) Mistakes in understanding questions. (3) Error in transformation. (4) Errors in process skills. (5) Errors in writing answers or drawing conclusions. Research conduct by Saleh that to analyze the errors that occurred in the students in solving problems analogies using procedure Newman show that errors types by Newman procedures and additional errors from student carelessness (Saleh, 2017). And research by Rohmah (2017) about Analisys Problem Solving in Mathematical Using Theory Newman show that actors errors students' is not to absorb information well, not understanding the transformation of the problem, not following the material thoroughly, and comprehension mathematical of weak concepts.

Based on the description of the background, the formula taken in this study is how students make mistakes in solving story problems based on Newman's procedures and what causes students to make mistakes in solving story problems based on Newman's procedures at Teacher Profesisional Education.

2. RESEARCH METHOD

The type of research used is descriptive with a qualitative approach. The subjects used in this study were teacher professional education students majoring in mathematics at the University of Muhammadiyah Malang. The steps of the research carried out are starting from research planning, implementing actions, analysis, and evaluating activities.

Data collection techniques used to collect implementation data are observation and tests. Observations were made to find out at what stage many mistakes were made by students and what difficulties experienced by students during the mentoring activities as well as recording or writing down findings and activities during the research. The test is used to see the work results of students who have then analyzed the results based on Newman's procedures.

Analysis of the data used in this study is to examine the results of student work which is then adjusted to Newman's stage. Then the results are described supported by the findings of the observation.

3. RESULT AND ANALYSIS

Data from research results obtained from observations and tests. Based on the error analysis of the Newman Procedure there were several errors made by students. The error has been categorized by researchers according to what is in the Newman Procedure. Based on the results of the research conducted, it can be explained that:

Table 1. Average errors made by students

No	Type of Error	Average
1	Error reading	9 %
2	Error understanding the problem	11,2 %
3	Transformation errors	12 %
4	Process skill error	33 %
5	Answer writing errors	8,2 %

Based on the table above, it can be said that the percentage of errors in each type is different. But the biggest mistake is the error in process skills, which is 33% and the smallest error is the type of answer writing error. Errors in solving the problem vary, and for more details regarding each type of error will be explained in the discussion below:

1. Reading error

There are some students who experience errors in the reading process, namely 9%. Reading is done in this case is to read the questions and then from the reading activity, students are asked to make a mathematical model. With the error in reading and making the mathematical model, the student will experience difficulties in understanding and solving it. Reading errors can be caused because students do not recognize the words or symbols in the problem so they do not find a solution to the problem. The ability to read students in dealing with various problems influences how students will solve a problem. Reading errors that are experienced by many students, for example, are in the case of students who cannot read words, symbols, or numbers that become keywords in the problem.

2. Error Understanding Problems

Errors in understanding the problems experienced by students are caused by students being able to read the questions well but cannot show the conditions in the problem so that students fail to find or try solutions to these problems. This type of error gets a percentage of 11.2%. Here are some mistakes students experience in solving story problems:

a. Do not write down what is known in the problem.
   Some students do not write down what is known in the problem and some students write what is known but not right. The mistake is made by students because students consider writing what is known in advance is less important so that students immediately do what is intended in the problem.
b. Cannot write down what was asked in the question.
   In this error students generally, have written what was asked in the question. However, some students write what is known incompletely, so it is unclear what the question is. Examples are as follows.

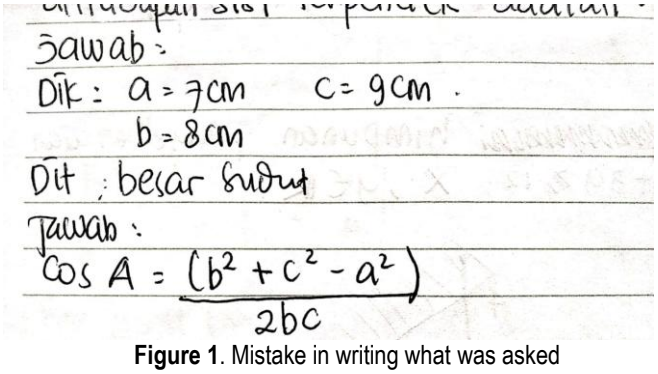

Figure 1. Mistake in writing what was asked

The picture shows that students only write what is known is a = 7 cm, b = 8 cm and c = 9 cm and what is asked is "how big is the angle?". The angle of what will be asked is not written down so that it becomes unclear what is meant in the question. If it matches the problem, what should be written is "how big is the angle before the shortest side?" By writing down what is asked in full, it will help a person to learn or make corrections to what is being done.

This type of error can strengthen the research conducted by

Rohmah & Sutiarso (2018) wherein the study explained that errors in understanding problems were 17.39%. The mistake was made by the students because of the inaccuracy in working on and assuming what was written in the part that was asked was not used as an assessment material.

3. Transformation Error

This type of error gets a percentage of 12%. Transformation errors are caused by students being able to understand what is asked in the problem but failing to determine the correct sequence of operations in solving the problem. Errors experienced by students in solving story problems are not able to determine mathematical operations or series of operations to solve the problems in the problem correctly. Examples of student work are in the picture below:

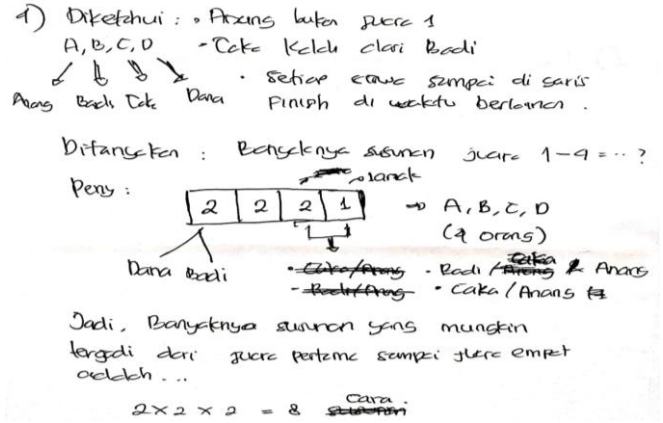

Figure 2. Error in determining the completion step

In the example of student work, it can be seen that students use the concept of opportunity in solving the problem, namely by writing down various possibilities that occur if there are 2 possibilities chosen so that the next opportunity is taken from the remaining names that have not been registered. But in the process students work unclearly and based on observations students experience confusion and hesitation in determining the composition

In addition, there are also students who cannot interpret the problem into an image. While the image can be used to help the process of solving the problem. Many students experience errors in describing the intent of the problem in the form of images. Examples of student work.

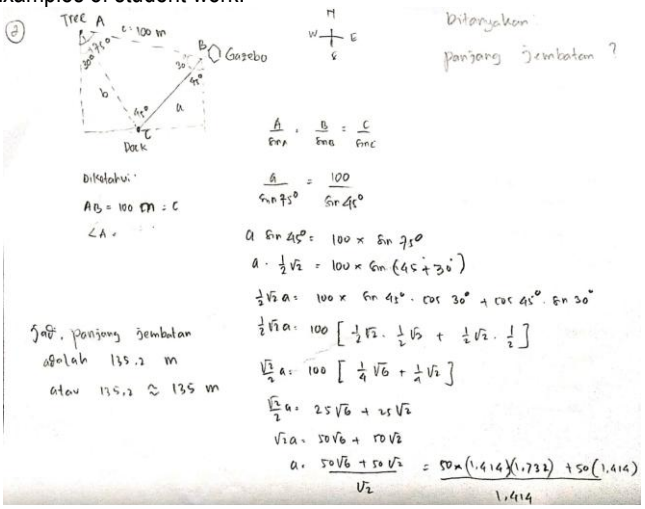

Figure 3. mistake in interpreting the question in the picture

Based on these images students experience difficulty in interpreting story problems into pictures. Images in the work should show the location of trees, bridges and, gazebos. With the existence of their respective positions in the questions are asked to calculate the length of the bridge. So that it must first be described or determined by the angle of each point. The problems experienced by students are mistakes when determining the location of bridges and gazebos. So the answers are given the experience a lot of errors because each position determines the angle to be measured.

Research conducted by Rohmah & Sutiarso (2018) also shows that errors at the transformation stage were 34.78%. The error was caused also by the carelessness of the students. The error in the transformation process also results in errors in the next process. Therefore the transformation process is very necessary for the understanding of students.

4. Process Skills Error

The percentage of errors in process skills is 33% or the most done by students. Skills that are often carried out by students are because students experience errors because students do not write in detail each step of completion resulting in errors in the next step, besides that also in the calculation and in determining what steps will be used to solve the problem in the problem. Students are basically able to determine the mathematical operations to be used but are still wrong in using the procedure. Here are some mistakes students experience in solving story problems, namely not knowing the procedure to solve the problem correctly even though they have determined the formula correctly, cannot carry out the steps of the counting operation used to solve the problem, cannot find the final results according to the procedure used to solve the problem.

The following are examples of student work related to processing errors.

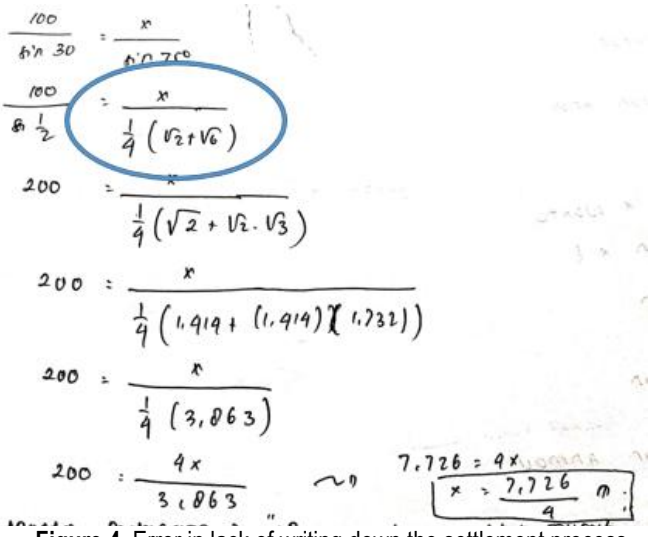

Figure 4. Error in lack of writing down the settlement process

The picture shows that in the second step the students did not write down the description of $\sin 75°$ dahulu first, so that the concept of what was written was not clearly known. So that the process is not completely done and will affect the next process. The step that should be done is to write the description of $\sin 75°$ first then the value of each.

Examples of student work:

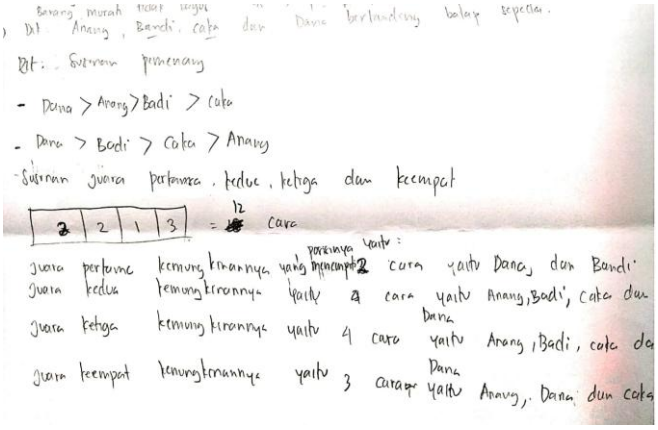

Figure 5. Mistake because students don't explain clearly

In the picture above students do not work in accordance with what is asked in the problem. Students should work using opportunity theory concepts and explain what has been done in the solution. But in the settlement process students do not write or use the rules in the concept of opportunity so that the process of explanation is unclear.

5. Answer Writing Error (Encoding Error)

Error writing answers are because students have completed the task until the end correctly, but cannot write down the intended answers correctly so that the meaning of the answer changes. Here are some of the mistakes students experience in solving story problems, which are not able to write answers correctly or cannot show conclusions about the final answer to the problem. Examples of student work are:

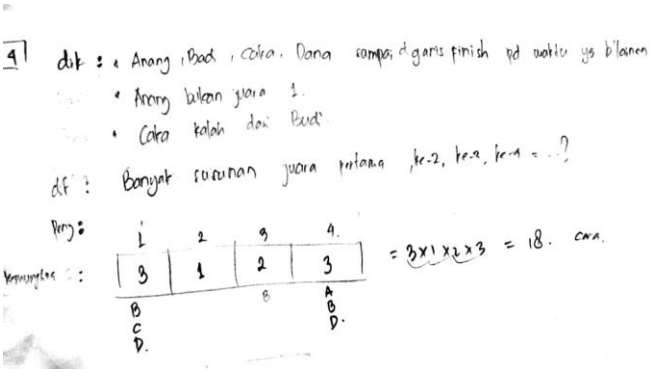

Figure 6. mistake for not writing an explanation of what was done

In this picture, the students only solve the problem according to the rules of opportunity. In the settlement, it cannot be seen what is meant by what has been done because the students did not conclude or express what was done. What should be done by the student is to explain what has been done so that the meaning is clear.

Based on the description of the explanation above, it can be said that many mistakes made by students are on process skills. The error is caused by students not being able to write down in detail each step of completion, resulting in errors in the next step, besides that in the calculation and in determining what steps will be used in solving the problem in the problem. This is in line with the research conducted by Amalia (2017) where the cause of mistakes that are often made by students is because students cannot understand the questions well, lack of mastery of the material, do not know the steps to solving the problem, are not careful in working on the questions, and do not write conclusions.

4. CONCLUSION

Based on the results of the discussion above, it can be concluded that the types of errors that are mostly done by students are on process skills errors, namely 33% and the lowest error is in the answer writing error that is 8.2%. These errors are caused by students who cannot read symbols, graphs, and charts, cannot understand the questions well, are wrong in the completion steps and do not write or describe conclusions properly.

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